Chemistry Practical Class 12 Determination of Concentration/Molarity of KMnO4 Solution by Titrating it against a Standard Solution of - Ferrous ammonium sulphate Viva Questions with Answers

Q1. Why is dil. sulphuric acid suitable for permanganate titration?

Answer. $KMnO_4$ acts as a good oxidising agent in acidic medium. If acid is not used KMnO4 may be oxidised to MnO_2 giving a brown precipitate.

Q2. What type of salt is Mohr's salt?

Answer. Mohr's salt, or ammonium iron(II) sulphate, is an inorganic compound with the formula $(NH_4)_2Fe(SO_4)_2.6H_2O$.

Q3. What is the formula for Mohr's salt?

Answer. The formula for Mohr's salt is $(NH_4)_2Fe(SO_4)_2.6H_2O$.

Q4. What are double salts?

Answer. A double salt is a mixture of two different salts taken together as a single substance in a specific molecular proportion.

Q5. What is the oxidation state of Fe in Mohr's salt?

Answer. In Mohr's salt, iron has an oxidation state of +2.

Q6. What is the distinction between double and complex salt?

Answer. A simple salt that dissociates in aqueous solutions is referred to as double salt. Complex salts can be simple or complex, but they do not dissociate in an aqueous solution.

Q7. What is a normal solution?

Answer. A normal solution is one that contains one gram-equivalent mass of the solute per litre of solution.

Q8. What is a standard solution?

Answer. A standard solution is one that has a known strength.

Q9. What are the different types of titration?

Answer. The different types of titration are:

- Iodometric titration
- Permanganate titration
- Complexometric titration
- Precipitation titration
- Acid-base titration
- Redox titration

Q10. What is the function of sulphuric acid in the titration of mohr salt against KMnO4?

Answer. The most basic role of sulphuric acid in the redox titration of the mohr salt against potassium permanganate is to prevent the hydrolysis of the ferric ion (Fe^{2+}) because the titration occurs in the presence of $KMnO_4$ or $K_2Cr_2O_7$, both of which are good oxidising agents.

Q11. Why is ferrous ammonium sulphate solution not heated before titration?

Answer. Heating of ferrous ammonium sulphate solution is not required in this titration because the reaction rate is very high even at room temperature. Furthermore, at high temperatures, oxygen in the air may oxidise ferrous ions to ferric ions, introducing errors into the experiment.

Q12. Why is nitric acid or hydrochloric acid not used in permanganate titration? Explain.

Answer. Nitric acid is not used because it is an oxidising agent in its own, and hydrochloric acid is usually avoided because it reacts with KMnO4 to produce chlorine, which is also an oxidising agent in an aqueous solution.

Q13. Why is dilute sulphuric acid added while preparing a standard solution of ferrous ammonium sulphate?

Answer. To prevent ferrous sulphate hydrolysis, dilute sulphuric acid is added. Excessive heating is avoided when dissolving the salt mixture in water. This is for preventing the conversion of Fe^{2+} ions (light green) to Fe^{3+} ions (yellow).

Q14. How will you prepare 100 mL of 0.1 M standard solution of ferrous ammonium sulphate?

Answer. To prepare a 0.1 M solution of ferrous ammonium sulphate, dissolve 3.92 grams of ferrous ammonium sulphate in 100 ml of distilled water.

Q15. Why is $KMnO_4$ not regarded as a primary standard?

Answer. $KMnO_4$ is not used as a primary standard because it is difficult to obtain in its pure state because it contains MnO_2. Furthermore, the colour is so bright that it acts as its own indicator.

Q16. What type of titrations are given the name redox titrations? Name some other redox titrations?

Answer. A redox titration is a titration that is based on a redox reaction between the analyte and the titrant. It is one of the most widely used laboratory methods for determining the concentration of unknown analytes.
Types of Redox Titrations

- Bromometry uses a bromine (Br_2) titrant.
- Cerimetry employs cerium(IV) salts.
- Dichrometry uses potassium dichromate.
- Iodometry uses iodine (I_2).
- Permanganometry uses potassium permanganate.

Q17. Which of the following is an oxidising agent and which is a reducing agent in the reaction of $KMnO_4$ and $FeSO_4$?

Answer. The oxidising agent is KMnO4, and the reducing agent is $FeSO_4$.

Q18. Why is Mohr's salt preferred as a primary standard in volumetric analysis over ferrous sulphate?

Answer. This is due to the fact that Mohr's salt is stable and does not readily oxidise in the presence of air. Ferrous sulphate is converted to ferric sulphate by oxidation.

Q19. Why are a few drops of dilute sulphuric acid added when making a standard Mohr's salt solution?

Answer. A few drops of H_2SO_4 are added to prevent ferrous sulphate from hydrolyzing.

Q20. Why isn't the ferrous ammonium sulphate solution heated before titration, but the oxalic acid is?

Answer. Before titration, oxalic acid is heated to remove any excess CO_2. However, no such decomposition occurs in the case of ferrous ammonium sulphate. It may also decompose into ferrous oxide when heated. As a result, this ferrous ammonium sulphate is not heated prior to titration.

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